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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/615,937	07/10/2003	Yoji Okazaki	Q76477	9937
23373	7590	08/08/2005	EXAMINER	
SUGHRUE MION, PLLC 2100 PENNSYLVANIA AVENUE, N.W. SUITE 800 WASHINGTON, DC 20037			VAN ROY, TOD THOMAS	
			ART UNIT	PAPER NUMBER
			2828	

DATE MAILED: 08/08/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

<p align="center"><b>Office Action Summary</b></p>	<p><b>Application No.</b></p> <p>10/615,937</p>	<p><b>Applicant(s)</b></p> <p>OKAZAKI ET AL.</p>	
	<p><b>Examiner</b> <i>WJ</i></p> <p>Tod T. Van Roy</p>	<p><b>Art Unit</b></p> <p>2828</p>	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-19 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-19 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 10 July 2003 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |   |  |
|---|--|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. ____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)  | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)            |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>07/10/2003</u> . | 6) <input type="checkbox"/> Other: ____  |

## **DETAILED ACTION**

### ***Priority***

Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

### ***Drawings***

The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference character(s) not mentioned in the description: fig.15 element 251b. Corrected drawing sheets in compliance with 37 CFR 1.121(d), or amendment to the specification to add the reference character(s) in the description in compliance with 37 CFR 1.121(b) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

### ***Specification***

The lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is

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requested in correcting any errors of which applicant may become aware in the specification.

The disclosure is objected to because of the following informalities:

Page 26 line 25 refers to figure 18, while it is believed this reference should be directed to figure 9.

Appropriate correction is required.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 1-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Craig et al. (US 5761234) in view of Andrews (US 5640188), and further in view of Andrews et al. (US 5432535) and Kuniyasu et al. (US 2002/0018499).

With respect to claims 1, 3, and 8 Craig teaches a laser light source comprising: a plurality of semiconductor lasers of a single cavity (col.7 lines 53-54) in the form of a chip (col.8 lines 60-61), a multimode optical fiber (fig.14 #18, col.10 lines 8-9), an optical condenser system which collects laser beams emitted from the plurality of semiconductor lasers and couples the beams to the optical fiber (fig.14 #72,74). Craig does not teach the lasers to be mounted on a plurality of submounts which is in turn mounted on a heat dissipation block, or that the semiconductor lasers are mounted on the submounts via AuSn and a metallization layer, and are of a nitride compound. Andrews '188 teaches a plurality of semiconductor lasers mounted on a plurality of submounts (fig.4 #'s 86), said submounts being themselves mounted on a copper heat dissipation block (fig.4 #64, taught to be made of one piece, col.5-6 lines 65-7). Andrews '535 teaches semiconductor laser submounts to be made of AlN (col.5 lines 16-19) and to be at least 200um thick (col.10 line 22). Kuniyasu further teaches the use of GaN based material ([0008]) to be flip chip mounted (fig.28, heat sink attached at top surface), and to be bonded to a heat sink through a metallization layer (fig.32 #258) and AuSn solder (fig.32 #231). It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the laser light source of Craig with the submounts and copper heat sink of Andrews '188 to provide heat dissipation (col.6 line 6) and reduce thermal cross talk between adjacent devices (col.7 lines 3-4), and the AlN material and thickness of the submounts of Andrews '535 as the material provides for proper support and heat conduction away from the devices (col.5 lines 4-26), and additionally incorporate the GaN material and mounting techniques of Kuniyasu to

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generate 400um wavelengths for use with photosensitive material ([0008]), remove excess heat from the active region ([0220]), and use bonding material that will not deteriorate while using additional heat removal techniques such as water flow ([0166]).

With respect to claim 2, Craig, Andrews, and Kuniyasu teach the laser light source as outlined in the rejection to claim 1 above, and Kuniyasu additionally teaches the GaN device to have a light emission region (fig.32 #249), and said metallization layer and said AuSn solder are separated by a groove (fig.32 #273) arranged below the light emission layer. It would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the groove of Kuniyasu into the laser light source in order to provide additional cooling for the device active regions by placing the cooling mechanism closer to the active region ([0232-233]).

With respect to claim 4, Craig, Andrews, and Kuniyasu teach the laser light source as outlined in the rejection to claim 1 above, recalling Kuniyasu's use of AuSn solder for the chip to mount connection, and Andrews '535 further teaches the submounts to be soldered to the heat dissipation block (col.5 lines 56-58). Andrews does not teach the solder to be of AuSn. It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the laser light source with the AuSn solder used to solder the submount to the heat dissipation block as the benefits of AuSn solder have been laid out by Kuniyasu as outlined in the rejection to claim 1.

With respect to claims 5 and 6, Craig, Andrews, and Kuniyasu teach the laser light source as outlined in the rejection to claim 1 above, and Craig further teaches the emission points to be arranged in a line parallel to the active layers (fig.14, beam

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emission parallel to active layer location for semiconductor laser chip), the condenser system to include a plurality of collimator lens (fig.16 #21, fig.14 #70,72,73 col.20 lines 43-44, formed in an array #72) and a condenser lens (fig.14 #74) which make the beams converge on an end face of the multimode fiber wherein the collimator lens have an aperture which has a first diameter parallel to said line and a second diameter perpendicular to said line and greater than the first diameter (inherent in that the function being claimed is that which is being performed by the condenser lens as seen in fig.14 by properly collimating both the fast and slow axis of the diverging beam, col.20 lines 33-50))

With respect to claim 7, Craig, Andrews, and Kuniyasu teach the laser light source as outlined in the rejection to claim 1 above, and Andrews '188 further teaches the heat dissipation block to be constituted by a plurality of blocks which are joined (col.5-6 lines 65-4, col.6 lines 21-24). It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the laser light source with the joined heat dissipation blocks in order to allow for the addition of a hermetic seal (col.6 lines 27-32) and to provide a single sturdy base for the laser mounts.

With respect to claim 9, Craig, Andrews, and Kuniyasu teach the laser light source as outlined in the rejection to claim 1 above, and Craig further teaches the multimode fiber to have a core diameter not greater than 50um and a numerical aperture not greater than .3 (col.20 lines 57, 58-59 – 50 um and .1, commercially available fibers).

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With respect to claim 10, Craig, Andrews, and Kuniyasu teach the laser light source as outlined in the rejection to claim 1 above, and Craig further teaches the core diameter times the numerical aperture not be greater than 10um ( $50 \times .1 = 5\text{um}$ ).

With respect to claims 11 and 12, Craig, Andrews, and Kuniyasu teach the laser light source as outlined in the rejection to claim 1 above, and Craig further teaches the number of sources to be selectable to fit the desired application (col.8 lines 20-22). Craig does not teach the specific number of sources to be six or seven. It would have been obvious to one of ordinary skill in the art at the time of the invention to optimize the number of utilized devices to fit the given application/power requirement etc. (see MPEP 2144.05 II - In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955) – disclosing that it is not inventive to discover the optimum or workable ranges by routine experimentation, i.e. optimizing the number of sources in the array).

With respect to claims 13 and 14, Craig, Andrews, and Kuniyasu teach the laser light source as outlined in the rejection to claim 1 above, but do not teach the specific emission width of the individual beam sources. It would have been obvious to one of ordinary skill in the art at the time of the invention to optimize the emission width to most efficiently couple with the lenses and fiber of the system (see MPEP 2144.05 II - In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955) – disclosing that it is not inventive to discover the optimum or workable ranges by routine experimentation, i.e. optimizing the emission width of each source).

With respect to claim 15, Craig, Andrews, and Kuniyasu teach the laser light source as outlined in the rejection to claim 1 above, and Andrews '188 further teaches



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the plurality of sources to be arranged in 2 dimensions when viewed from a laser receiving side (fig.4). It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the laser light source with the 2-d arrangement in order to provide for a denser, and closely spaced diode array when assembled (col.7 lines 8-9).

Claims 16-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Craig in view of Andrews '188, Andrews '535, and further in view of Kuniyasu and Hwang (US 5337325).

With respect to claims 16-19, Craig, Andrews, and Kuniyasu teach the laser light source as outlined in the rejection to claim 1 above. Craig, Andrews, and Kuniyasu do not teach a plurality of the devices, including the multimode fiber outputs being coupled in 1-d arrays or bundles. Hwang teaches a laser light source (exposure – 'display' in abs.) with a plurality of laser devices (fig.1 #16) that have outputs connected to fibers arranged in 1-d arrays and bundles (bundle – fig.1 #14, fig.4; 1-d array- any area size possible as taught in col.3 lines 52-54). It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the laser light source of Craig, Andrews, and Kuniyasu with the plurality of arranged sources and optical fiber configuration of Hwang in order to create a high power array of sources without the inherent heating problem of stacking multitudes of laser devices (col.1 lines 10-35, 60-68) for use in various fields (light source/exposure system for printing – col.1 lines 50-55 – and display – abs.)

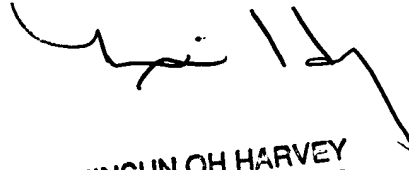
***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tod T. Van Roy whose telephone number is (571)272-8447. The examiner can normally be reached on M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Minsun Harvey can be reached on (571)272-1835. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

TVR

  
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PRIMARY EXAMINER